

REMARKS

Claims 7-15 and 21-24 were pending at the time of this office action. Claims 7, 12, 13, and 21-24 have been amended. Claims 25-29 have been added. Thus, claims 7-15 and 21-29 are present for examination. Reexamination and reconsideration of the application, in view of the following remarks, are requested.

The examiner has requested that applicant amend the title so that it is more descriptive. Thus, applicant has amended the title to read, "Print Data Control System Using Distributed Processing Of Print Data."

Claims 7-15 and 21-24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Nagasaka, U.S. Patent No. 5,511,156.

The examiner's rejection of claims 7-15 and 21-24 is respectfully traversed.

Independent claims 7, 13, 21, 22, 23, and 24 have been amended. As amended, these claims recite, among other features, that print data is divided into a plurality of print data bands, and that the print data bands are transferred sequentially to sequentially available print data expanders. These features are neither disclosed nor suggested in Nagasaka. The bands recited in these claims are obtained by dividing a page of print data into bands of data in the printing direction (from the top of a page to the bottom). The bands of data are transferred sequentially in the printing direction to a sequentially available print data expander. After a band has been transferred to a print data expander, the subsequent band is selected and transferred to another available expander. Thus, print data expanding is performed in parallel from the top of a page to the bottom or in the printing direction.

Claims 7, 13, and 21-24 further recite that expanded bit-map band data is combined after being transferred to the print server computer. In a distributed system, because there may be differences in processing speeds among the client computers and the print server computer, the print server computer does not always receive the expanded bit-map band data in the original sequence. Therefore, the print server

computer stores the received bit-map band data and rearranges the bit-map band data to put it in the original sequence. It is an advantage of the present invention that, because the bands are expanded in parallel by the client computers and the print server computer, there is a very good likelihood that the bands are expanded in the original sequence. This results in an extremely simplified rearranging operation (see e.g. step S407 of Fig. 4). Thus, a high speed printing operation is performed and a reduced amount of buffer memory is required.

In Nagasaka, on the other hand, the intermediate code file is divided into a plurality of partial files. In Fig. 27, for example, a printable area is divided into a plurality of oblong areas. However, Nagasaka teaches group discrimination in connection with the division of the printable area into oblong areas. Accordingly, an overlap between two graphic form elements is detected to determine whether these elements are part of the same graphic form group. [Nagasaka, col. 22, ln. 40 through col. 23, ln. 42] Nagasaka does not teach how the divided oblong areas are expanded in the system to obtain a high printing speed. Because of the group discrimination, however, there is a low probability that the divided oblong areas are expanded in the original sequence. Accordingly, the system and method disclosed in Nagasaka may result in a significant rearranging operation and, therefore, a low-speed printing operation and a need for more buffer memory.

In addition, claims 7, 13, and 21-24 further have been amended to recite that the plurality of bands are transferred to available print data expanders without grouping the bands. Applicant believes that this feature further distinguishes the claims from Nagasaka. As discussed above, Nagasaka teaches group discrimination. As shown in Nagasaka's Figure 27, although Nagasaka divides the print data into a plurality of oblong areas, Nagasaka groups the oblong areas according to detected graphic form groups before transferring the oblong areas to processors for processing. Applicant discloses dividing the print data into bands and sequentially transferring the bands, without consideration of graphic form groups. Thus, claims 7, 13, and 21-24 have been amended to explicitly recite that the bands are transferred without grouping. For this additional reason, applicant believes that claims 7, 13, and 21-24 recite features

that are neither disclosed nor suggested in Nagasaka.

In view of the amendments to claims 7, 13, and 21-24, applicant believes that each of the claims is now in condition for allowance. The examiner's rejection of claims 7-15 and 21-24 is respectfully traversed.

Dependent claims 25-29 have been added. Claim 25-29 recite that when one of said print data expanders finishes expanding a transferred band of print data, then the one of said print data expanders notifies the transfer controller that the one of said print data expanders is available. If the transfer controller has not already transferred each of the plurality of bands, then the transfer controller transfers a next sequential one of the plurality of bands to the one of said print data expanders.

Claims 25-29 recite features that are neither disclosed nor suggested in Nagasaka. Nagasaka teaches a plurality of computers (6a, 6b and 6c) that are connected to each other via a network. [Nagasaka, col. 6, Ins. 36-37.] Nagasaka teaches that when a client process in one of the plurality of computers generates a printing request, the client process divides a code file into a plurality of partial files that are processed independently in a distributed fashion. [Nagasaka, Abstract.] For example, a computer 6a may generate a printing request and distribute the PDL (page description language) translation processing to computers 6a, 6b and 6c, so that the picture element formation may be executed by the parallel processing of the plural computers. [Nagasaka, col. 6, Ins. 25-30.] When the plural computers complete their processing, the computers return the partial picture element information to the requesting unit. [Nagasaka, Abstract.] The requesting unit then combines the picture element information returned from the other processing units that form an entire picture element. [Nagasaka, Abstract.]

Nagasaka does not disclose or suggest each of the features recited in new claims 25-29. Specifically, Nagasaka does not disclose that when a processing unit completes processing, that it notifies the requesting unit that it is available. Further, Nagasaka does not disclose that when one of the processing units completes the processing of a partial file and becomes available, that the requesting unit may send this processing unit another partial file to process. Thus, applicant believes that new

claims 25-29 are in condition for allowance.

In view of the foregoing, it is respectfully submitted that the present application is in condition for allowance. Re-examination and reconsideration of the application, as amended, and allowance of the claims at an earlier date is respectfully requested.

Respectfully submitted,

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Atty. Dkt. No. 043034-0135

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Masaki WATANABE

Title: PRINT DATA CONTROL SYSTEM
USING DISTRIBUTED
PROCESSING OF PRINT DATA
(Amended)

Appl. No.: 09/174,551

Filing Date: 10/19/98

Examiner: K. Poon

Art Unit: 2624

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MARKED UP COPY OF AMENDMENT AND REQUEST FOR RECONSIDERATION
UNDER 37 C.F.R. § 1.111

Commissioner for Patents
Box Non-Fee Amendment
Washington, D.C. 20231

Sir:

This communication is response to the office action dated May 3, 2002,
concerning the above referenced patent application.

Please amend the application as follows:

IN THE CLAIMS:

7. (Amended Three Times) A network system composed of a print server computer and a plurality of client computers, wherein each of the print server computers and the plurality of client computers has a print data expander for expanding print data to bit-map band data in parallel, wherein each of the plurality of client computers comprises:
a page divider for dividing generated print data for each page into a plurality of

bands, wherein the generated print data is generated by an application; and

a transfer controller for transferring a sequentially selected one of the bands to ~~ana~~ sequentially available one of print data expanders of the print server computer and other client computers, said transfer being performed without grouping said bands, wherein expanded bit-map band data by the print data expander of each client computer is transferred to the print server computer, and

the print server computer comprises:

a combiner for combining bit-map band data expanded by the print data expander of the print server computer and the expanded bit-map band data received from at least one of the client computers to produce combined bit-map band data corresponding to the generated print data.

12. (Amended) The network system according to claim 11, wherein the combiner receives the bit-map band data expanded by the print data expander of the print server computer and the expanded bit-map band data received from said at least one of the client computers, determines whether the bit-map band data are received in original sequence of the bands, rearranges the bit-map band data in the original sequence when a sequence of the bit-map band data is not identical to the original sequence, and reproduces the combined bit-map band data corresponding to the generated print data.

13. (Amended) A print data control method for a network system composed of a print server computer and a plurality of client computers, comprising the steps of:

at each of the plurality of client computers,

a) dividing print data into a plurality of sequential bands;

b) distributing the sequential bands, without grouping the bands, sequentially over the print server computer and at least one of the client computers to expand the sequential bands to bit-map band data in parallel among the print server computer and said at least one client computer; and

at the print server computer,

c) combining the bit-map band data expanded by the print server computer and said at least one client computer to produce combined the-bit-map band data corresponding to the print data.

21. (Twice Amended) A network system comprising a print server computer and a plurality of client computers, wherein each of the plurality of client computers comprises:

a first print data expander for expanding print data to bit-map band data;

a page divider for dividing generated print data for each page into a plurality of bands, wherein the generated print data is generated by an application; and

a transfer controller for transferring a sequentially selected one of the bands to ~~ana~~ sequentially available one of print data expanders of the print server computer and other client computers, said transfer being performed without grouping said bands, wherein expanded bit-map band data by the print data expander of each client computer is transferred to the print server computer,

the print server computer comprising:

a second print data expander for expanding print data received from at least one of the client computers to bit-map band data in parallel with said first print data expander;

a combiner for combining bit-map band data expanded by the print data expander of the print server computer and the expanded bit-map band data received from at least one of the client computers to produce combined bit-map band data corresponding to the generated print data.

22. (Twice Amended) A client computer in a network system comprising a print server computer and a plurality of client computers, said client computer comprising:

a print data expander for expanding print data to bit-map band data;

a page divider for dividing generated print data for each page into a plurality of bands, wherein the generated print data is generated by an application; and

a transfer controller for transferring a sequentially selected one of the bands to ~~ana~~ sequentially available one of print data expanders of the print server computer and other client computers, said transfer being performed without grouping said

bands, wherein expanded bit-map band data by the print data expander of the client computer is transferred to the print server computer,

wherein the print server computer combines bit-map band data expanded by the printer server computer and the expanded bit-map band data received from at least one of the client computers to produce combined bit-map band data corresponding to the generated print ~~data~~data.

23. (Twice Amended) A network system comprising a plurality of client computers and a server program for instructing a print server computer, wherein each of the plurality of client computers comprises:

a first print data expander for expanding print data to bit-map band data;

a page divider for dividing generated print data for each page into a plurality of bands, wherein the generated print data is generated by an application; and

a transfer controller for transferring a sequentially selected one of the bands to ~~ana sequentially~~ available one of print data expanders of the print server computer and other client computers, said transfer being performed without grouping said bands, wherein expanded bit-map band data by the print data expander of each client computer is transferred to the print server computer, and ~~wherein~~

the server program comprises the steps of:

expanding print data received from at least one of the client computers to bit-map band data in parallel with said first print data expander;

combining bit-map band data expanded by the print data expander of the print server computer and the expanded bit-map band data received from at least one of the client computers to produce combined bit-map band data corresponding to the generated print data.

24. (Twice Amended) A network system comprising a print server computer, a plurality of client computers and a client program for instructing a client computer, said program comprising the steps of:

expanding print data to bit-map band data;

dividing generated print data for each page into a plurality of bands, wherein the

generated print data is generated by an application; and

transferring a sequentially selected one of the bands to ~~an~~ a sequentially
available one of print data expanders of the print server computer and other client
computers, wherein expanded bit-map band data by the print data expander of each
client computer is transferred to the print server computer-2